11.   (Amended). An apparatus as in Claim 10 wherein the computer
       repeats the calculation steps above and averages
       measurements of <u>a reference spectrum, R,</u> and <u>a sample
       spectrum, S,</u> to determine the absorption value.

12.   (Amended) An apparatus as in Claim 1 wherein the light
       source and optical pick up are placed in an optical head
       housing positioned adjacent a side opening in a product
       chute, and the wavelength separator and detector are placed
       remotely from the product chute, and wherein an optical
       fiber [,] is connected between the optical pick up and the
       wavelength separator to couple light energy between them.

16.   (Amended) A method for determining <u>a</u> constituent
       [components] <u>component</u> of a flowing stream of an
       agricultural product as it is being [processed] <u>harvested</u>
       on a real time basis <u>within mobile agricultural equipment</u>,
       the method comprising the steps of:
            irradiating a sample portion of the flowing stream of
       agricultural product as it is being processed with a
       plurality of wavelengths within a selected irradiation
       bandwidth within a short [wave] <u>wavelength</u> near infrared
       spectrum;
            picking up light energy [diffusely] reflected from the
       irradiated sample portion;
            separating wavelengths of the picked up [diffusely]
       reflected light to produce spatially separated light of
       different wavelengths; and
            detecting intensity signals from the separated
       wavelengths [simultaneously] at multiple selected
       wavelengths to [simultaneously] determine multiple light
       intensities.

19. A method as in Claim 16 wherein the flowing stream of agricultural product is <u>located</u> in [a] <u>an agricultural</u> combine.

Delete Claims 20-21.

26. (Amended) [An] <u>A</u> method as in Claim 25 wherein the step of calibrating is repeated to average measurements of <u>a</u> <u>reference spectrum,</u> R, and <u>a sample spectrum,</u> S, to determine the absorption value.

Delete claim 27.

28. (New) An apparatus as in Claim 1 wherein the detector further comprises a detector array connected to produce detected intensity signals indicative of light intensity simultaneously at multiple selected wavelengths.
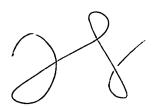
29. (New) A short wavelength-near infrared (SW-NIR) analysis system for obtaining percentage concentrations of constituents of a composite substance, comprising:

means for irradiating a composite substance simultaneously with short wavelength-near infrared (SW-NIR) radiation;

means for simultaneously picking-up electromagnetic radiation reflected from different parts of said composite substance;

means for spatially separating a plurality of wavelengths of the reflected electromagnetic radiation;

means for individually detecting in parallel a plurality of wavelengths of the reflected electromagnetic

radiation to obtain percentage concentration of the various constituents of said composite substance; and

wherein the SW-NIR analysis system is attached to an agricultural combine for analyzing a flowing stream of agricultural produce on a real time basis during harvesting thereof.

30. (New) An apparatus for determining at least one constituent component of a flowing stream of an agricultural product as it is being harvested on a real time basis, the apparatus comprising:

a light source, arranged to irradiate a sample portion of the flowing stream of agricultural product as it is being harvested with a plurality of wavelengths within a selected irradiation bandwidth within a short wavelength-near infrared spectrum;

an optical pick up, arranged to receive light energy reflected from the irradiated sample portion;

a linear variable filter, connected to receive light from the optical pick up, and to produce spatially separated light of different wavelengths;

an optical fiber, disposed between the optical pick up and the wavelength separator, to couple light energy from the optical pick up to the linear variable filter; and

a charge coupled device detector array connected to receive light from the wavelength separator, and to produce detected intensity signals indicative of light intensity at multiple selected wavelengths within the dispersing filter bandwidth.

26
31. (New)   An apparatus as in Claim 25 wherein the wavelength separator and detector are arranged such that the detected intensity signals at a given sample time represent the response of the apparatus for a range of wavelengths as taken from a sample portion of the flowing stream.

27
32. (New)   An apparatus as in Claim 25 additionally comprising:
        a mode mixer, coupled to the optical fiber, to attenuate variations in optical intensity of the light from the pick up introduced by the optical fiber.

28
33. (New)   An apparatus as in Claim 25 wherein the flowing stream of agricultural product is in an agricultural combine.

29
34. (New)   An apparatus as in Claim 25 wherein the flowing stream of agricultural product is in a grain processor.

30
35. (New)   An apparatus as in Claim 25 wherein the flowing stream of agricultural product is in a storage facility.

33
36. (New)   An apparatus as in Claim 25 additionally comprising:
        an analog to digital converter, connected to receive the detected intensity signals and to provide detected intensity values.

34
37. (New)   An apparatus as in Claim 33 additionally comprising:
        a computer, connected to receive the detected intensity signals from the detector, and to determine the percentage of at least one constituent component present in the sample portion of the agricultural product from the detected intensity values.

30

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35.
36. (New)   An apparatus as in Claim 34 wherein the computer repeats the determination steps above to determine an average value for the percentage of at least one constituent component.

33.
39. (New)   An apparatus as in Claim 25 wherein the light source and optical pick up are placed in an optical head housing positioned adjacent an opening in a product chute, and the wavelength separator and detector are placed remotely from the product chute, and wherein an optical fiber is connected between the optical pick up and the wavelength separator to couple light energy between them.

31.
40. (New)   An apparatus as in Claim 25 wherein the constituent component is selected from the group consisting of protein, moisture, oil, starch, density, and hardness.

37.
41. (New)   A method for determining at least one constituent component of a flowing stream of an agricultural product as it is being harvested on a real time basis, the method comprising the steps of:

irradiating a sample portion of the flowing stream of agricultural product while it is being harvested with a plurality of wavelengths within a selected irradiation bandwidth within a short wavelength-near infrared spectrum;

picking up light energy reflected from the irradiated sample portion;

separating wavelengths of the picked up reflected light to produce spatially separated light of different wavelengths; and

detecting intensity signals from the separated wavelengths simultaneously at multiple selected wavelengths

to simultaneously determine light intensity at multiple wavelengths.

42. (New) A method as in claim 41 additionally comprising the step of:

mixing the light energy provided by the picking up step to attenuate variations in optical intensity of the light.

43. (New) A method as in Claim 41 wherein the steps of separating and detecting are performed such that the detected intensity signals at a given sample time represent the response for a range of wavelengths as taken from a sample portion.

44. (New) A method as in Claim 41 wherein the step of separating is performed by a linearly variable filter.

45. (New) A method as in Claim 41 wherein the flowing stream of agricultural product is in an agricultural combine.

46. (New) A method as in Claim 41 wherein the flowing stream of agricultural product is in a grain processor.

47. (New) A method as in Claim 41 wherein the flowing stream of agricultural product is in a storage facility.

48. (New) A method as in Claim 41 additionally comprising the step of:

converting the detected intensity signals to provide digital detected intensity values.

45
49. (New) A method as in Claim 37 additionally comprising the step of:

determining at least one constituent component of the sample portion of the agricultural product from the detected intensity values.

46
50. (New) A method as in Claim 45 additionally comprising the steps of:

selectively performing the step of picking up reflected light by operating a pick up shutter in a closed or open position;

selectively performing the step of separating wavelengths by operating an optics block shutter, in a closed or open position; and

wherein the step of determining at least one constituent component by determining an absorptivity further comprises the steps of:

measuring a dark spectrum, D, as the response with the optics block shutter closed;

measuring a reference spectrum, R, by opening the optics block shutter and closing the pick up shutter;

measuring a sample spectrum, S, with both shutters open; and

determining a light absorption value, A, at the selected wavelength from the relationship

$$A = \text{LOG}_{10} \ (R\text{-}D/S\text{-}D).$$

47
51. (New) A method as in Claim 46 wherein the step of calculating is repeated to average measurements of R and S to determine the absorption value.

33

52. (New) A short wavelength-near infrared analysis system for obtaining percentage concentrations of constituents of a composite substance, comprising:

means for irradiating a composite substance simultaneously with short wavelength - near infrared radiation over a specified bandwidth;

means for picking-up electromagnetic radiation reflected from said composite substance;

means for mode mixing the reflected electromagnetic radiation to attenuate variations in intensity due to vibration;

means for spatially separating wavelengths of the reflected electromagnetic radiation as produced by the means for mode mixing;

means for individually detecting in parallel the wavelengths of the spatially separated electromagnetic radiation to obtain percentage concentration of the various constituents of said component substance; and

wherein the analysis system is attached to an agricultural combine for analyzing a flowing stream of agricultural produce on a real time basis during harvesting thereof.